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RECOGNITION OF TWO SPECIES OF DOUBLE-LINED MACKERELS (*GRAMMATORCYNUS*: SCOMBRIDAE)

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Abstract.—*Grammatorcynus* has been considered to be monotypic by recent authors. Electrophoretic work by A. D. Lewis indicates the presence of two species in Australia. These are identified herein as: (1) *G. bilineatus* (Rüppell, 1836); type-locality: Red Sea; "scad"; a wide-spread species (Red Sea to Tonga); with many gill rakers (19–24), large eye (7–9% of fork length), and smaller maximum size (60 cm FL, 3 kg); and (2) *G. bicarinatus* (Quoy and Gaimard, 1844); type-locality: Shark Bay, Western Australia; "shark mackerel"; limited to the northern coasts of Australia and the Gulf of Papua; few gill rakers (12–15), small eye (3–5% of FL), and larger maximum size (110 cm FL, 13.5 kg).

Most recent authors (e.g., Silas 1963; Collette 1979) have considered *Grammatorcynus* to be monotypic. In correspondence with me and in his doctoral dissertation, Lewis (1981) presented electrophoretic evidence that there are two species in Australia: a small species, the "scad," that is unspotted, and a larger one, the "shark mackerel," that frequently has dark spots on its lower sides. This brief paper presents morphological evidence for recognition of two species: the widely distributed scad, *G. bilineatus* (Rüppell) and the shark mackerel *G. bicarinatus* (Quoy and Gaimard), restricted to Australia and southern New Guinea. This evidence supports inclusion of both species in the FAO World Catalogue of scombrids (Collette and Nauen, in press). A revision of *Grammatorcynus* with discussion of its relationships to other scombrids is in progress.

Grammatorcynus bilineatus (Rüppell, 1836) Scad
Fig. 1A

Thynnus bilineatus Rüppell, 1836:39–40, pl. 12, fig. 2 (original description, Red Sea).

Grammatorcynus bilineatus Gill, 1862:125 (*T. bilineatus* type-species of new genus).

Nesogrammus piersoni Evermann & Seale, 1907: 61–62, pl. 1, fig. 3 (original description; Bulan, Sorsogon Province, Luzon, Philippine Is.).

Diagnosis.—A species of *Grammatorcynus* with many gill rakers, (3–5) + 1 + (13–18) = 19–24 on the first arch (Table 1); a large eye, 7–9% of FL (see Fig. 2); matures at a small size, about 430 mm FL; maximum size about 600 mm FL, 3 kg. Seldom with dark spots on the lower sides of the body.

Range.—Widespread in the Indo-West Pacific. Based on the literature and material examined, known from the Red Sea, Andaman Sea, East Indies, Philippines, Ryukyu Islands, New Guinea (New Britain, New Ireland, New Hanover, and the Louisiade Archipelago), Australia (Scott Reef off northern Western Aus-

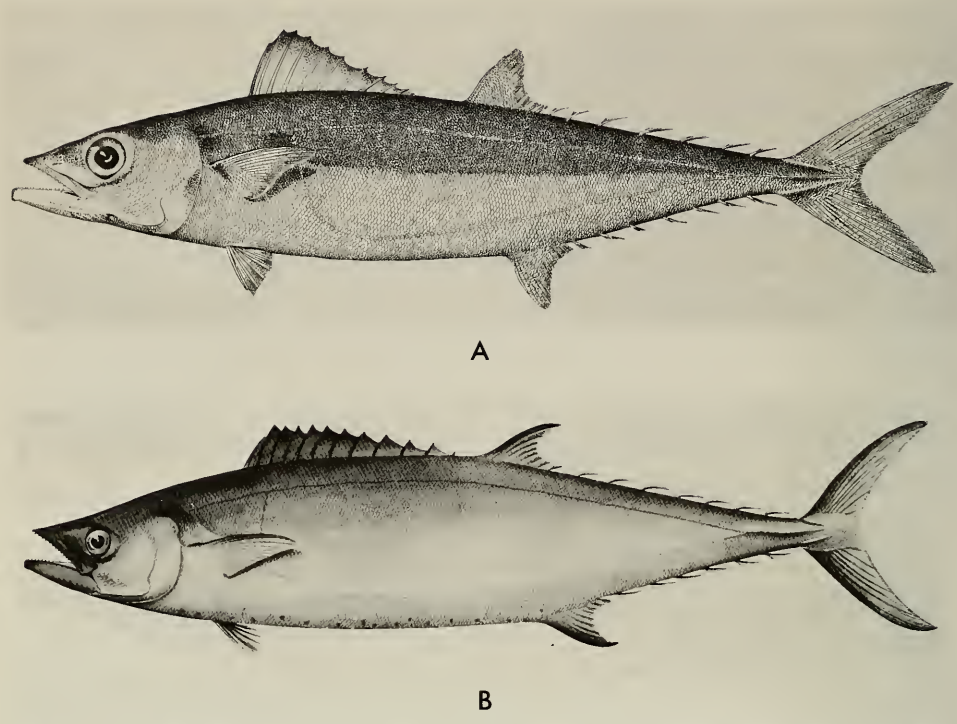

Fig. 1. Two species of *Grammatorcynus*. A, *G. bilineatus* (from Evermann and Seale 1907, fig. 3, holotype of *Nesogrammus piersoni*, 372 mm FL, Philippine Islands); B, *G. bicarinatus* (from McCulloch 1915, pl. 1, fig. 1, 925 mm FL, New South Wales, Australia).

tralia, eastern Queensland), the Solomon Islands, New Caledonia, the Caroline Islands, Marshall Islands, Fiji, and Tonga.

Material examined.—52 specimens (23.5–575 mm FL) from 36 lots: Red Sea (13 specimens including Senckenburg Museum 2755, the stuffed holotype of *Thynnus bilineatus*), Andaman Sea (4), Celebes (2), Philippines (5 including USNM 55899, the holotype of *Nesogrammus piersoni*), New Guinea (7), Australia (7), Solomons (1), Carolines (3), Marshalls (8), and Fiji (2).

Grammatorcynus bicarinatus (Quoy and Gaimard, 1824) Shark Mackerel
Fig. 1B

Thynnus bicarinatus Quoy and Gaimard, 1824:357, pl. 61, fig. 1 (original description; Baie des Chiens-Marins = Shark Bay, W. Australia).

Grammatorcynus bicarinatus McCulloch, 1915:266–269, pl. 1, fig. 1 (description; off Cook Is., near Tweed River Heads, New South Wales; 925 mm FL, 18.75 lbs.).

Diagnosis.—A species of *Grammatorcynus* with few gill rakers, (1–2) + 1 + (10–12) = 12–15 on first arch (Table 1); a small eye, 3–4% of FL (see Fig. 2); reaches large size, probably 1100 mm FL, 13.5 kg. Frequently has dark spots on the lower sides of the body (Fig. 1B).

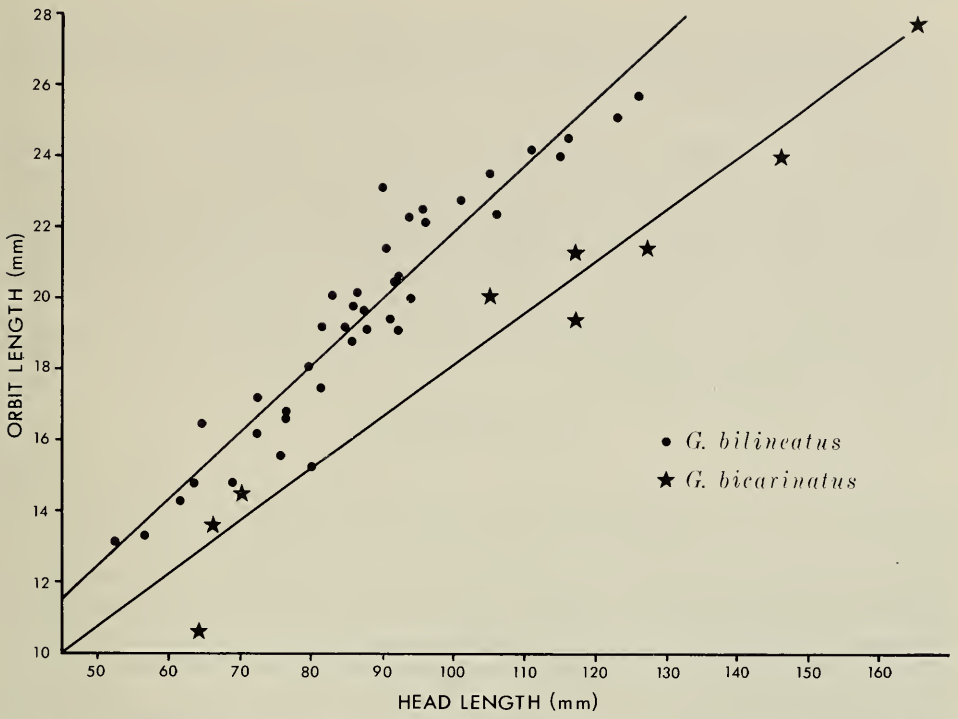

Fig. 2. Regression of orbit length on head length in two species of *Grammatorcynus*. Regression equation for *G. bilineatus* (n = 44), Y = 2.923 + 0.189X; for *G. bicarinatus* (n = 9), Y = 3.593 + 0.144X. Probability that regressions are the same (by ANCOVA), $P < 0.0000001$; that the slopes are equal, $P = 0.0032$; and that the intercepts are equal, $P < 0.0000001$.

Table 1.—Total number of gill rakers in the species of *Grammatorcynus*.

Species and area	12	13	14	15	16	17	18	19	20	21	22	23	24	N	$\bar{x}$
G. bilineatus															
Red Sea									1	6	2	2	1	12	21.7
Andaman Sea											3	1		4	22.3
Celebes Islands									2					2	20.0
Philippine Islands								1	—	2	1			4	20.8
New Guinea								1	3	1	—	1		6	20.5
Australia								1	2	1	1			5	20.4
Solomon Islands										1				1	21.
Caroline Islands										1	1	1		3	22.0
Marshall Islands								1	1	6				8	20.6
Fiji Islands									1	1				2	20.5
Total								4	10	19	8	5	1	47	21.1
G. bicarinatus	1	—	6	2										9	14.0

Range.—Positively known only from the northern coasts of Australia with occasional stragglers south to 30°S on both east (Cook Is., N.S.W.) and west (Shark Bay, W.A.) coasts and in the Gulf of Papua off southern New Guinea (A. D. Lewis, pers. comm.).

Remarks.—The original description of *bicarinatus* is not detailed enough to tell which species is involved, the figure is poor, and there is no type-material. I use the name because the shark mackerel extends further south on the coasts of Australia than does the scad, to Cook Island, N.S.W. on the east (McCulloch 1915) and to Exmouth Gulf, W.A. (USNM uncat.) and, presumably Shark Bay on the west.

Material examined.—9 specimens (300–825 mm FL) from 8 lots: Western Australia (4); Queensland (5).

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